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(54) MILK AND GAS CONTAINING BEVERAGE

(57) A milk containing beverage containing a dissolved gas is arranged in a pressurised beverage container. When the container is broached and the beverage poured out dissolved gas comes out of solution to form a dispersion of bubbles in the beverage. This may produce a milk-shake like effect. The gas may be nitrous oxide; the beverage may be flavoured and/or contain alcohol and may have a fat content of 7%-12%.

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"Beverage, Method of producing a beverage, and a product containing a beverage"

This invention relates to a beverage, a method of producing a beverage and a product containing a beverage, all related particularly, but not exclusively, to a dispersion of bubbles caused by a dissolved gas coming out of solution in the beverage.

The production of a dispersion of bubbles in a beverage so as to confer a foamy or frothy texture is advantageous in some beverages, for example milk shakes, which are more appealing to the consumer in a frothy state. Other advantages may also be gained, for example a reduced volume of liquid may produce a given volume of frothy beverage.

US Patent No 3,615,718 discloses a method for the production of solid ice cream and ice milk by expelling an aqueous composition of water and milk proteins from an aerosol container pressurized with a propellant gas. The composition is passed through a restricted orifice in the nozzle of the container, and the resultant agitation produces a dispersion of bubbles in the composition resulting in a whipped up solid. A valve is required at the restricted orifice and is operable to allow some of the composition to be expelled from the container, whilst maintaining a pressurised condition within the container.

According to a first aspect of the present invention there is provided a method of producing a dispersion of bubbles in a milk-containing beverage, the method comprising dissolving a gas in the beverage, sealing the beverage and dissolved gas in a broachable container, allowing pressure to be induced within the container and broaching the container to release the pressure therein, such that upon dispensing the beverage, at least some of the dissolved gas comes out of solution to form the dispersion of bubbles in the beverage.

Preferably the gas is dissolved in the beverage under pressure.

An advantage gained by the present invention is that the beverage does not need to be expelled at high speed through an orifice in order to generate the dispersion of bubbles.

The dispersion of bubbles may produce a frothy, milk-shake like effect.

According to a second aspect of the present invention there is provided a product comprising a pressurised beverage container containing a pressurised milk containing beverage in which the beverage has a gas dissolved therein and in which at least a portion of the dissolved gas is arranged to come out of solution to form a dispersion of bubbles in the beverage when the beverage is dispensed.

A portion of the dissolved gas may be arranged to come out of solution when the container is opened or broached.

Preferably, the beverage is of low-medium viscosity. The beverage may contain at least 85% milk, preferably at low-medium viscosity.

The gas may be, for example, N_2O, HFC or HCFC. The gas may comprise or include carbon dioxide. However, the properties of carbon dioxide may make it less desirable than the aforementioned gases. Carbon dioxide imparts a sharpness of flavour to milk which is not usually desirable in products of this type. In addition its slight acidity can alter the properties of the milk proteins and cause coagulation and separation of the solids. This latter aspect can be rectified by the addition of buffering agents and stabilizers but the overall effect does not enhance the product.

A mixture of gasses or a mixture of any of the aforementioned gasses may be used. The beverage may be saturated or supersaturated with the gas or gasses. Bubbles of gas may be suspended in the beverage before and/or after broaching of the container.

One or more flavourings may be added to or included in the beverage, for example, chocolate, fruit flavours, malt, coconut, vanilla, coffee, orange, banana.

The container is optimally broached at a temperature of between 2°C and 10°C. The container may be in the form of a can, bottle, carton or other openable package capable of withstanding pressure. The container may be non-reusable. Broaching the container may expose its entire contents to atmospheric pressure. Alternatively, the container may be a barrel; it may have an external pressure source. It may be arranged to allow withdrawal or dispensing of a portion of its contents whilst maintaining pressure on the beverage retained in

the container.

The beverage may optionally contain alcohol or an alcoholic beverage, preferably a spirit, for example, vodka, gin, or whisky or a liqueur; it may have additional flavourings which may advantageously be incorporated into the alcoholic beverage, for example, a fruit or mint liqueur. Where the beverage contains alcohol, or an alcoholic beverage, the alcohol is preferably present in a quantity of at least 1% by volume of the beverage. The beverage may contain up to 20% alcohol by volume. A greater proportion of alcohol may be used if desired.

An important optional feature of the invention is that the dispersion of bubble in the beverage may be enhanced when the beverage is dispensed from the container. Preferably, the beverage does not increase substantially in volume whilst in the container, and is not therefore inclined to overflow from the container.

According to a third aspect of the present invention there is provided a beverage comprising a milk base containing nitrous oxide gas dissolved in the milk base and also comprising alcohol.

Alcohol may be contained in the beverage, preferably above 1% by volume and preferably up to 20% by volume.

The beverage may be contained in a pressurised container wherein the nitrous oxide causes dispersion of bubbles within the beverage on being poured from the container.

Alternatively, the beverage may be dispensed from a tap, wherein the nitrous oxide causes dispersion of

bubbles within the beverage on being poured from the tap.

According to a fourth aspect of the present invention there is provided a beverage comprising a milk base and having nitrous oxide gas dissolved in the milk base, wherein the beverage is maintained under pressure until ready for consumption.

The beverage may be maintained under pressure in a broachable beverage can. Alternatively, the beverage may be maintained under pressure in a storing means for dispersing from a tap.

Ingredients in the beverage may include, for example, any one or any combination of the following:

i) Any substance suitable for use as a food or commonly used as a food
ii) Flavouring
iii) Colouring, emulsifier, stabiliser, sweetener or miscellaneous additive
iv) Starch (modified or not)
v) Salt
vi) Vitamin or mineral preparation, for example, Vitamin D
vii) Water
viii) Chocolate
ix) Fruit
x) Vegetable fat
xi) Milk Solids not fat (MSNF)
xii) Cream
xiii) Stabiliser
xiv) Milk powder
xv) Milk
xvi) alcohol

The fat content of the beverage may be important in producing the desired effect. Preferably, the beverage contains substantially between 7% and 12% fat. Where a milk base is used, the milk base may contain substantially between 0%-4% fat; the fat content of chocolate used may vary between about 25% to 35%.

Embodiments of the present invention will now be described, by way of example only.

The following are a number of alternative basic recipes for a base mixture of a milk containing beverage.

1 Full fat milk 86.9%: dairy milk chocolate 8.5%; plain chocolate 4.5%; stabiliser 0.05% to 0.2%, for example, Alginates, Xanthans, Carrageenin or mixtures thereof).

2 For thin liquid mixture: 92% skimmed milk; 7.9% milk chocolate; 0.1% stabiliser or alternatively, 90% full fat milk; 2% plain chocolate; 7.9% milk chocolate; 0.1% stabiliser.

3 For a mixture of average thickness: 87% full fat milk; 4.9% plain chocolate; 8% milk chocolate; 0.1% stabiliser or alternatively, 87% full fat milk; 12.9% white chocolate; 0.1% stabiliser.

4 For a thick consistency of mixture: 85% whole milk; 4.9% white chocolate; 8% milk chocolate; 2% cornflour; 0.1% stabiliser or alternatively, 85% whole milk; 4.9% plain chocolate; 8% milk chocolate; 2% coffee creamer; 0.1% stabiliser.

Typically, stabiliser or stabilisers may be included in a quantity of 0.05% to 0.2%.

All the measurements given in these ingredients are percentage by weight. The beverages are in liquid form with a viscosity similar to single cream unlike known compositions containing Nitrous Oxide which are frozen or solid products. The viscosity of the beverage of the invention varies with temperature but is generally a medium viscosity liquid.

The following method is used to form the mixture. The chocolate solid is supplied or broken down into granular form and mixed with half of the milk used in the recipe in a mixing tank. The term milk is used to encompass all types of milk and milk like products and, in particular, full fat, whole, skimmed and UHT milk. The temperature is raised whilst stirring to at least 50°C until all the chocolate is melted and dispersed. This takes several minutes. The second half of the milk is mixed cold with the stabiliser and stirred until the stabiliser is fully dissolved. The two milk portions are then combined and cooled to a temperature of between 0 and 3°C.

The cooled milk is supersaturated with gas by injecting and metering gas under pressure of around 80psi. This can be done in a variety of ways which are well established in the beverage industries. For example, when transferring the product from the mixing tank to a storage tank, gas can be injected into the transfer pipe and a suitable back pressure kept on the receiving tank. Dispersion of the gas is enhanced by pumping the gas/liquid mixture through a plate heat exchanger to increase the contact area and time. Alternatively, gas can be injected at the base of an agitated tank which is held under a predetermined back pressure. A further method is to recirculate the product from a tank through a gas injection system and then return it under

pressure to the same tank.

The gassed beverage is then packaged and quickly sealed by sealing a lid onto the container to avoid loss of the nitrous oxide, or other gas used, from the mixture.

Pasteurisation is achieved by conventional means, for example, by spraying the containers with hot water. Pasteurisation can be achieved at varying temperatures depending on the length of time the containers are exposed at the given temperature. For example, a container in the form of a can may be raised to a temperature of 70°C for one hour; preferably, less rigorous regimes are employed. The beverage may be flash pasteurised and the containers filled under aseptic conditions. The beverage may be pasteurised in accordance with The Milk Based Drinks (Hygiene and Heat Treatment) (Amendment) Regulations 1986 (1986/720). For example, in-package pasteurisation may be achieved by holding the beverage at a temperature of at least 63°C for a minimum of 30 minutes. Alternatively, for aseptic filling the flash pasteurisation conditions may require a holding time of at least 15 seconds at a minimum temperature of 72°C. The product should then be cooled as soon as practicable and retained at a temperature below 10°C.

The mixture is gassed up with nitrous oxide to a level of between one and four volumes. Gases other than nitrous oxide could be used, for example, HFCs or HCFCs. The addition of nitrous oxide is preferred as it has suitable solubility properties. It is inert and neutral and only imparts of very slight sweetness to the product. The solubility of nitrous oxide in water or milk is enough to produce a good foaming effect under the required temperature and pressure conditions.

Typically, two volumes of gas are dissolved in the milk product.

When the container is broached by opening a closure of the container, for example, a ring pull on a can, the product does not immediately expand such that the container overflows. However, the effect when pouring out the product from the container is dramatic due, it is believed, to agitation and seeding of the bubbles caused by natural, non-forced nucleation of the gas dissolved in the beverage. The product can expand to over double its volume and produce a finely dispersed foam. The foam gradually collapses over a period of time. If the product is left in the container it will tend to expand and creep up slowly as the dissolved gas comes out of solution due to the reduction in pressure.

The beverage can also be contained in a storage container under pressure and dispensed from a tap, for example at a bar. Preferably, dispersion of the gas only occurs on the pouring of the beverage when the Nitrous Oxide or other gas nucleates.

In addition, as an optional addition to the ingredients, alcohol can be added to the mixture, for example in the form of vodka. The alcohol may be added to the milk before gassing the milk with nitrous oxide and packaging. Ideally, 5-10% alcohol would be added or up to a maximum of 20%.

The product may contain preservatives and/or stabilisers to ensure that it remains fresh and/or homogeneous for a desired period of time.

The product should be dispensed at a temperature above freezing, preferably at a temperature of between 2°C

and 10°C.

Modifications and improvements may be made to the above without departing from the scope of the present invention.

Claims

1 A pressurised beverage container containing a pressurised milk containing beverage in which the beverage has a gas dissolved therein and in which at least a portion of the dissolved gas is arranged to come out of solution to form a dispersion of bubbles in the beverage when the beverage is dispensed.

2 A container in accordance with Claim 1 in which the beverage contains at least 85% milk.

3 A container in accordance with Claim 1 or Claim 2 in which the dissolved gas comprises nitrous oxide.

4 A container in accordance with any preceding claim in which the dissolved gas comprises a mixture of gasses.

5 A container in accordance with any preceding Claim in which the beverage is saturated or super-saturated with the dissolved gas.

6 A container in accordance with any preceding claim in which the container is broachable and in which bubbles of gas are suspended in the beverage before and/or after broaching of the container.

7 A container in accordance with any preceding claim in which the container is in the form of a can, bottle or carton.

8 A container in accordance with any preceding claim in which the beverage contains between 1% and 20%

alcohol by volume.

9 A container in accordance with any preceding claim in which dispersion of bubbles in the beverage is enhanced when the beverage is dispensed from the container.

10 A container in accordance with any preceding claim in which the beverage does not increase substantially in volume whilst in the container when the container is broached.

11 A container in accordance with any preceding Claim in which the beverage has a fat content of between 7% and 12%.

12 A method of producing a dispersion of bubbles in a milk containing beverage, the method comprising dissolving a gas in the beverage, sealing the beverage and dissolved gas in a broachable container, allowing pressure to be induced within the container and broaching the container to release the pressure therein, such that upon dispensing the beverage, at least some of the dissolved gas comes out of solution to form the dispersion of bubbles in the beverage.

13 A beverage substantially as described herein with reference to any one of the given examples.

The Patent Office

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Application No: GB 9607756.5 **Examiner:** Martin Davey
Claims searched: 1-13 **Date of search:** 27 June 1996

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B8C ; CWA1

Int Cl (Ed.6): B65D

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0 577 284 A2	(GUINESS) See in particular col.1,lines 1 to 15 .	1-12
X	EP 0360 373 A1	(ARTHUR GUINESS) See in particular col.2,lines 29 to 5 .	1-12
X	WO 95/04689 A1	(SMITHCLINE BEECHAM) See in particular page1,line19 to page2,line23 and page9,lines30 to 32.	1-12
X	WO 93/24384 A1	(COSTELLO & KERSHAW) See in particular page2,lines1 to 64 .	1-12
X	US 4,832,968	(FORAGE) See in particular page1,lines 7 to24 .	1-12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.